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CLIMATE SCENARIO ANALYSIS

María J Nieto,
Bank of Spain

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Climate change has been recognized by policy makers as a **source of risk** for

- ✓ Health (*Naumann et al., 2020*)
- ✓ Infraestructure *(Mendelsohn, 2009)*
- ✓ Economic competitiviness and economic growth
- ✓ Financial stability *(NGFS, 2019)*

Understanding climate risk is a precondition for the design of **climate policy**

- Materializes over **very long period of time**

- High **uncertainty**:
  - ✓ Projections future CO_2 emissions;
  - ✓ Link CO_2 emisions and T° pathways over long term horizons
  - ✓ Future technological developments

- Past is not a good predictor of the future

- Characterized by **non-linearities and tipping points** in system´s reaction to human activities (*Steffen et al 2018*)

- There are also **path dependencies** in policy decisions

- Give rise to potentially destabilizing **feedback loops** across heterogeneous actors and sectors (*Monasterolo et al 2019*)

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- Climate scenarios represent **probable representations** of future evolution profiles of **greenhouse gas concentrations** and various **adaptation/mitigation strategies** associated with them (*IPCC, 2000*)

  Need of *a priori* assumptions*:*

  Government policy:

  - *Price of CO_2 emissions*
  - *Subsidies*

  Technological changes:
  Carbon removal technologies …

- Most used **modelling approach** to assess the **costs of climate policy** compared to the costs of inaction

- Limitations:

  - ✓Neglect catastrophic climate outcomes *(Pyndyck, 2017)*
  - ✓Climate sensitivity subject to high uncertainty *(Pyndyck, 2017)*
  - ✓Damage function subject to high uncertainty *(Pyndyck, 2017)*
  - ✓Financial and monetary dimensions are neglected *(Dafermos et al, 2018; Battiston et al, 2021)*

• Limitations (Cont.)

✓**Spatial resolution** is **limited** to macro regions of the world → Downscaling 136 countries by the Consortium

✓**Sectors´ market** share are **not granular** enough → Consortium´s work in progress

✓IAMs capture the overall economic impact of climate risks but provide **limited number of economic variables**

✓ IAMs are not well suited for
  ✓comprehensive ec analysis of D and S channels of transmission
  ✓ different assumptions around fiscal and monetary policy responses

- To expand the number of economic variables:

  ✓ NiGEM: New Keynesian model w/ **rationale and adapted** expectations → Climate module to 2050 (*NGFS, 2021*)

  ✓ **Agent based models** and **stock flow consistent macroec models** → Better account for endogeneity and complexity (*Monasterolo and Raberto, 2017*)

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THANK YOU